Litton BIONETICS

Mutagenic Evaluation of Compound FDA 73-68-Propyl paraben (USP) 5-30-75

MUTAGENIC EVALUATION OF
COMPOUND FDA 73-68

000094133

PROPYL PARABEN (USP)

R24

7315 Wisconsin Avenue
Bethesda, Maryland
20014

LBI PROJECT #2468

MUTAGENIC EVALUATION OF COMPOUND FDA 73-68

000094133

PROPYL PARABEN (USP)

SUBMITTED TO

FOOD AND DRUG ADMINISTRATION
DEPARTMENT OF HEALTH, EDUCATION AND WELFARE
ROCKVILLE, MARYLAND

SUBMITTED BY

LITTON BIONETICS, INC.
5516 NICHOLSON LANE
KENSINGTON, MARYLAND

MAY 30, 1975

Litton BIONETICS

TABLE OF CONTENTS

EVALUATION SUMMARY

Compound FDA 73-68, Propyl Paraben, did not exhibit genetic activity in any of the *in vitro* microbial assays employed in this evaluation.

DATE: May 30, 1975

SPONSOR: Food and Drug Administration, Contract Number 223-74-2104

SUBJECT: Evaluation of Test Compound 000094133, Propyl Paraben (USP) FDA 73-68

I. OBJECTIVE

The objective of this study was to evaluate the test compound for genetic activity in microbial assays with and without the addition of mammalian metabolic activation preparations.

II. MATERIALS

A. Test Compound

1. Date Received: August, 1974

2. Description: White powder

B. Indicator Microorganisms

The following strains of indicator microorganisms were used in the evaluation:

Yeast Strain: *Saccharomyces cerevisiae*, strain D4

Bacteria Strains: *Salmonella typhimurium*, strains: TA-1535
TA-1537
TA-1538

C. Reaction Mixture

The following reaction mixture was employed in the activation tests:

Component	Final Concentration/ml
1. TPN (sodium salt)	6.0 µM
2. Isocitric acid	49.0 µM
3. Tris buffer, pH 7.4	28.0 µM
4. $MgCl_2$	1.7 µM
5. Tissue homogenate fraction	72.0 mg

D. Tissue Homogenates and Supernatants

The tissue homogenates and 9,000 x g supernatants were prepared from tissues of the following mammalian species: Mouse-ICR random bred adult males; rat-Sprague-Dawley adult males; and primate-Macaca mulatta adult males.

E. Positive Control Compounds

Table 1 lists chemicals for positive controls in the direct and activation assays.

TABLE 1

POSITIVE CONTROLS USED IN DIRECT AND ACTIVATION ASSAYS

Assay	Chemical[a]	Solvent	Probable Mutagenic Specificity
Nonactivation	Ethyl methanesulfonate	Water or saline	BPS[b]
	2-Nitrofluorene	Dimethylsulfoxide[c]	FS[b]
	Quinacrine mustard	Water or saline	FS[b]
Activation	Dimethylnitrosamine	Water or saline	BPS[b]
	2-Acetylaminofluorene	Dimethylsulfoxide[c]	FS[b]

[a] Concentrations given in the Results Section
[b] BPS = base-pair substitution; FS = frameshift
[c] Previously shown to be non-mutagenic

III. METHODS

A. Toxicity

The solubility, toxicity and doses for all chemicals were determined prior to screening.

Each chemical was tested for survival against the specific indicator strains over a range of doses to determine the 50% survival dose. Bacteria were tested in phosphate buffer, pH 7.4, for one hour at 37°C on a shaker. Yeasts were tested in phosphate buffer, pH 7.4, for four hours at 30°C on a shaker. The 50% survival curve and the 1/4 and 1/2 50% doses calculated.

If no toxicity was obtained for a chemical with a given strain, then a maximum dose of 5% (w/v) was used against the strain.

Unless otherwise specified, the doses calculated for the tests in buffer were applied to the activation tests. The solubility of the test chemical under treatment conditions is stated in the Results Section.

B. Plate Tests

In the nonactivation procedure, approximately 10^9 cells of a log-phase culture of the bacterial indicator strains were spread over the surface of a minimal plate, and a measured amount of the test chemical was placed in the center of the test plate. In activation tests, the test chemical was added to the cells, and an aliquot of the mixture was spread on the surface of the test plate. The reaction mixture (0.1 ml) plus tissue extract was then spotted on the surface of the plate. Positive and solvent controls were included. All plates were incubated at 37°C for four days and then scored. Each compound (test, positive control and solvent control) was done in duplicate. Concentrations of the positive control compounds are listed in the Results Section.

C. Suspension Tests

1. Nonactivation

Log-phase bacteria and stationary-phase yeast cultures of the indicator organisms were grown in complete broth, washed and resuspended in 0.9% saline to densities of 1×10^9 cells/ml and 5×10^7 cells/ml, respectively. This constituted the working stock for tests of a group of test chemicals and their respective controls. Tests were conducted in plastic tissue culture plates. Cells plus appropriate volume(s) of the test chemical were added to the wells to give a final volume of 1.5 ml. The solvent replaced the test chemical in the negative controls. Treatment was at 30°C for four hours for yeast tests and at 37°C for one hour for bacterial tests. All flasks were shaken during treatment. Following treatment, the plates were set on ice. Aliquots of cells were removed, diluted in sterile saline (4°C) and plated on the appropriate complete media. Undiluted samples from flasks containing the bacteria were plated on minimal selective medium in reversion experiments. Samples from a 10^{-1} dilution of treated cells were plated on the selected media for enumeration of gene conversion with strain D4. Bacterial plates were scored after incubation for 48 hours at 37°C. The yeast plates were incubated at 30°C for 3-5 days before scoring.

2. Activation

Bacteria and yeast cells were grown and prepared as described in the nonactivation tests. Measured amounts of the test and control chemicals plus 0.25 ml of the stock-cell suspension were added to wells of the Linbro plate containing the appropriate tissue fraction and reaction mixture. All flasks (bacteria and yeast) were incubated at 37°C in an oxygen atmosphere with shaking. The treatment times as well as the dilutions, plating procedures and scoring of the plates were the same as described for nonactivation tests.

D. Preparation of Tissue Homogenates and 9,000 x g Cell Fractions

Male animals (sufficient to provide the necessary quantities of tissues) were killed by cranial blow, decapitated and bled. Organs were immediately dissected from the animal using aseptic techniques and placed in ice-cold 0.25 M sucrose buffered with Tris at pH of 7.4. Upon collection of the desired quantity of organs, they were washed twice with fresh buffered sucrose and completely homogenized with a motor-driven homogenizing unit at 4°C. The whole organ homogenate obtained from this step was divided into two samples. One sample was frozen at -80°C and the other was centrifuged for 20 minutes at 9,000 x g in a refrigerated centrifuge. The supernatant from the centrifuged sample was retained and frozen at -80°C. These two frozen samples were used for the activation studies.

E. Data Recording and Reporting

Following the specified incubation periods all population plates were scored by an automatic colony counter and the results from each plate of a set were recorded, in ink, on data processing forms. All minimal or other types of selective media plates were hand scored and the results recorded along with the respective population data. Other relevant experimental data were recorded on experimental definition forms. For bacteria strains the number of colonies recorded from either the population or selective plates represents that number in 1 ml of test suspension

IV. RESULTS SECTION

A. Solubility Properties of the Test Compound

1. Name or code designation of the test compound: 000094133
Propyl Paraben (USP)

2. Test solvent: DMSO

3. Solubility of the test compound under treatment conditions:
Soluble under treatment conditions.

4. Additional comments: White powder

B. Toxicity and Dosage Determinations for the Test Compound

1. Test date for toxicity determination: February 11, 1975

2. The 50% survival level was determined for bacteria and yeast indicator organisms by conducting survival curves with the test compound at the following concentrations:

Percent Concentration (w/v or v/v)

5.0
0.5
0.05
0.005
0.0005

3. Concentrations of the test compound used in the mutagenicity tests:

Dose	Percent Concentration	
	Bacteria	Yeast
1/4 50% Survival	0.0375	0.025
1/2 50% Survival	0.0750	0.050
50% Survival	0.1500	0.100
Plate Tests	0.0750	--

V. SUMMARY OF TEST RESULTS

Plate Tests

A. Name or code designation of the test compound: 000094133

B. Test date: March 29, 1975

C. Concentration of the test compound: 0.075%

Test		Species	Tissue	TA-1535		TA-1537		TA-1538	
				1	2	1	2	1	2
1.	Nonactivation								
	Solvent Control	---	---	11	20	4	5	15	11
	Positive Control[a]	---	---	$>10^5$	$>10^5$	193	207	145	134
	Test Compound	---	---	5	4	1	5	5	11
2.	Activation								
	Negative Control	---	---	7	10	6	3	7	12
	Solvent Control	---	---	20	24	5	9	15	14
	Reaction Mixture Control	---	---	23	20	7	8	18	16
	Positive Control[b]	Mouse	Liver	$>10^3$	$>10^3$	39	34	343	357
	Positive Control		Lung	12	8	2	1	11	16
	Positive Control		Testes	16	17	3	8	7	11
	Positive Control	Rat	Liver	$>10^3$	$>10^3$	89	88	347	341
	Positive Control		Lung	14	7	2	3	14	18
	Positive Control		Testes	16	13	5	7	10	13
	Positive Control	Monkey	Liver	273	356	30	33	123	119
	Positive Control		Lung	8	8	2	2	13	14
	Positive Control		Testes	15	12	3	6	8	11
	Test Compound	Mouse	Liver	2	5	1	5	9	12
	Test Compound		Lung	4	2	2	3	7	10
	Test Compound		Testes	3	2	4	5	7	7
	Test Compound	Rat	Liver	2	4	7	9	4	4
	Test Compound		Lung	1	2	2	1	2	5
	Test Compound		Testes	3	1	5	1	4	9
	Test Compound	Monkey	Liver	2	3	3	5	3	7
	Test Compound		Lung	3	4	1	2	8	3
	Test Compound		Testes	5	3	2	1	1	3

a TA-1535 EMS 10 µl/plate
TA-1537 QM 20 µg/plate
TA-1538 NF 100 µg/plate

b TA-1535 DMNA 50 µM/plate
TA-1537 AAF 100 µg/plate
TA-1538 AAF 100 µg/plate

DATA TABLE TERMS AND ABBREVIATIONS

ABBREVIATION OR TERM	DEFINITION OR EXPLANATION
COMPOUND	Client designated compound number appears in this column.
TEST CODES	NAN = Nonactivation: Solvent Control NAP = Nonactivation: Positive Control NA1 = Nonactivation: Test Compound Dose 1 NA2, etc. = Reflects the other dose level(s) A+C = Negative Chemical Control A-C = Activation: Solvent Control ACP = Activation: Positive Control ACT = Activation: Test Compound A+T = Activation: Tissue Control LI = Liver Tissue Activation Fraction LU = Lung Tissue Activation Fraction KI = Kidney Tissue Activation Fraction TE = Testes Tissue Activation Fraction 1,2, etc. = Dose Levels
CONCENTRATION	All test compound dose levels are expressed as a whole number followed by an exponent (negative) identified by the appropriate units. Example: 0025-2PCT = 0.25 percent concentration
POPU	Total number of viable cells in the plating sample raised to some exponent printed directly below the abbreviation (i.e., EP + 6 = x 10^6).
MUT 1	Total number of mutants or convertants obtained from the sample plated raised to some exponent printed directly below the abbreviation (i.e., EP + 0 = x 10^0). For strain D4, MUT 1 represents the number of ADE+ convertants.
MUT 2	Only used for strain D4 and represents the number of TRY+ convertants in the plated sample.
FREQ 1	The calculated mutation or gene conversion frequency times the negative exponent written directly below. For strain D4, FREQ 1 represents the ADE+ value.
FREQ 2	Only used for strain D4 and represents the TRY+ conversion frequency.
CONTAM	Presence of contamination on any plates.

DATA TABLE TERMS AND ABBREVIATIONS (continued)

ABBREVIATION OR TERM	DEFINITION OR EXPLANATION
AAF	2-Acetylaminofluorene
DMSO	Dimethylsulfoxide
DMN	Dimethylnitrosamine
EMS	Ethyl Methanesulfonate
QM	Quinacrine Mustard
NF	Nitrofluorene
SPECIES	Animal Strains
SPRDAW	Sprague Dawley Rats
ICRFLO	Flow ICR Random Bred Mice
RHESUS	Rhesus Monkey (Macaca mulatta)
MIXEDB	Dog, Mixed Breed
NEWZEA	New Zealand White Rabbit

LITTON BIONETICS MUTAGENIC ACTIVITY SYSTEM
REPORT EXR34

COMPOUND FREQUENCY SUMMARY REPORT 05/15/75

SPECIES COMPOUND 000094133

TEST	ORG	TA1535 HIS EX-8	TA1537 HIS EX-8	TA1538 HIS EX-8	0000D4 ADE EX-5	0000D4 TRY EX-5
NAN		10.15	2.10	9.02	1.58	1.69
NAP		273.70	225.89	145.97	113.25	60.11
NA1		21.19	4.20	10.66	0.34	0.69
NA2		18.20	2.73	9.11	0.91	1.36

LITTON BIONETICS MUTAGENIC ACTIVITY SYSTEM
REPORT EXR34

COMPOUND FREQUENCY SUMMARY REPORT 05/15/75

SPECIES ICRFLO COMPOUND 001323393

TEST	ORG	TA1535 HIS EX-8	TA1537 HIS EX-8	TA1538 HIS EX-8	0000D4 ADE EX-5	0000D4 TRY EX-5
ACT	A+C	5.99	2.10	11.20	16.01	4.11
ACT	A+T	12.45	2.10	10.46	15.24	3.26
ACT	A-C	6.65	2.91	10.54	19.85	3.33
ACT	PLI	1168.86	10.07	37.43	20.62	4.92
ACT	PLU	8.06	2.19	12.57	39.08	3.22
ACT	PTE	9.32	2.86	12.54	23.53	3.29
ACT	LI1	9.17	2.67	23.02	17.25	4.58
ACT	LI2	9.71	2.58	19.05	30.67	3.78
ACT	LU1	9.24	1.07	17.95	17.18	2.54
ACT	LU2	10.83	2.61	6.40	15.56	2.28
ACT	TE1	9.98	3.35	12.98	14.73	3.56
ACT	TE2	8.09	2.20	11.60	21.40	7.36

LITTON BIONETICS MUTAGENIC ACTIVITY SYSTEM
REPORT EXR34

COMPOUND FREQUENCY SUMMARY REPORT 05/15/75

SPECIES SPRDAW COMPOUND 000094133

TEST	ORG	TA1535 HIS EX-8	TA1537 HIS EX-8	TA1538 HIS EX-8	0000D4 ADE EX-5	0000D4 TRY EX-5
ACT	A+C	17.47	0.63	5.39	0.58	0.39
ACT	A+T	11.03	1.23	10.55	2.35	2.75
ACT	A-C	11.62	0.58	5.36	0.72	0.18
ACT	PLI	1500.00	7.28	59.37	8.75	10.22
ACT	PLU	18.29	0.84	7.31	3.40	1.39
ACT	PTE	22.47	0.33	8.13	3.38	1.93
ACT	LI1	15.62	0.56	15.03	2.93	6.27
ACT	LI2	11.32	0.52	11.64	3.24	6.81
ACT	LU1	17.97	0.89	11.73	1.15	2.30
ACT	LU2	13.69	0.61	10.06	1.37	2.73
ACT	TE1	18.67	0.67	17.43	2.18	3.51
ACT	TE2	7.97	0.75	10.48	1.81	2.59

LITTON BIONETICS MUTAGENIC ACTIVITY SYSTEM
REPORT EXR34

COMPOUND FREQUENCY SUMMARY REPORT 05/15/75

SPECIES RHESUS COMPOUND 000094133

TEST	ORG	TA1535 HIS EX-8	TA1537 HIS EX-8	TA1538 HIS EX-8	0000D4 ADE EX-5	0000D4 TRY EX-5
ACT	A+C	7.43	7.44	4.49	10.40	1.65
ACT	A+T	14.05	11.84	4.09	15.69	2.55
ACT	A-C	7.01	7.04	5.55	14.76	2.24
ACT	PLI	1352.79	19.31	24.13	14.99	2.71
ACT	PLU	4.62	6.35	2.77	12.58	2.35
ACT	PTE	8.16	8.79	6.29	20.07	2.79
ACT	LI1	15.38	4.19	1.71	13.68	2.20
ACT	LI2	6.53	7.82	3.30	12.83	3.34
ACT	LU1	11.18	9.09	2.49	13.58	3.27
ACT	LU2	4.62	5.47	2.25	14.44	4.40
ACT	TE1	12.50	5.32	2.81	9.09	1.52
ACT	TE2	9.29	5.12	2.33	11.08	2.77

VI. INTERPRETATION OF RESULTS AND CONCLUSIONS

Compound FDA 73-68, Propyl Paraben, was evaluated for genetic activity in a series of *in vitro* microbial assays with and without metabolic activation. The following results were obtained:

A. *Salmonella typhimurium*

1. Plate tests

At a concentration of 0.075%, this compound was not mutagenic for any of the indicator strains used in direct or activation plate tests.

2. Nonactivation suspension tests

The results of these tests were negative. Slight increases were noted in the NA1 and NA2 with TA-1535, but the maximum increase was only two-fold.

3. Activation suspension tests

The results of these tests were negative.

B. *Saccharomyces cerevisiae*

1. Nonactivation suspension tests

The results of these tests were negative.

2. Activation suspension tests

The results of these tests were negative. Occasional increased frequencies were noted, but no pattern was evident indicating genetic activity.

C. Conclusions

The test compound Propyl Paraben, did not exhibit genetic activity in any of the *in vitro* assays employed in this evaluation.

Submitted by:

David Brusick, Ph.D.
Director of Genetics

APPENDIX

Tabulation of Data

Litton BIONETICS

REPORT EXR33 LITTON BIONETICS MUTAGENIC ACTIVITY SYSTEM
COMPOUND SUMMARY BACKUP DETAIL

CONTRACT 22374-2104 PROJECT 02468
EXPERIMENT 505803 DETECTOR TA1535 SPECIES DATE - 05/15/75

COMPOUND	TEST	ORG ID	CONCENTRATION	POPU EP+6	MUT1 EP+0	FREQ1 EP-8	CONTAM
	NAN		SALINE	1340	0136	10.15	0
	NAP		EMS 0.002 %	1327	3632	273.70	0
000094133	NA1		0075-3 PCT.	0354	0075	21.19	0
000094133	NA2		0375-4 PCT.	0577	0105	18.20	0

Litton BIONETICS

REPORT EXR33 LITTON BIONETICS MUTAGENIC ACTIVITY SYSTEM
COMPOUND SUMMARY BACKUP DETAIL

CONTRACT 22374-2104 PROJECT 02468
EXPERIMENT 508301 DETECTOR TA1537 SPECIES DATE - 05/15/75

COMPOUND	TEST	ORG ID	CONCENTRATION	POPU EP+6	MUT1 EP+0	FREQ1 EP-8	CONTAM
	NAN		SALINE	0713	0015	2.10	0
	NAP		QM 1.0 UG/ML	0421	0951	225.89	0
000094133	NA1		0075-3 PCT.	0357	0015	4.20	0
000094133	NA2		0375-4 PCT.	0549	0015	2.73	0

Litton BIONETICS

REPORT EXR33 LITTON BIONETICS MUTAGENIC ACTIVITY SYSTEM
COMPOUND SUMMARY BACKUP DETAIL

CONTRACT 22374-2104 PROJECT 02468
EXPERIMENT 505802 DETECTOR TA1538 SPECIES DATE - 05/15/75

COMPOUND	TEST	ORG ID	CONCENTRATION	POPU EP+6	MUT1 EP+0	FREQ1 EP-8	CONTAM
	NAN		DMSO	0599	0054	9.02	0
	NAP		NF 125 UG-ML	0546	0797	145.97	0
000094133	NA1		0075-3 PCT.	0272	0029	10.66	0
000094133	NA2		0375-4 PCT.	0439	0040	9.11	0

Litton BIONETICS

REPORT EXR33 LITTON BIONETICS MUTAGENIC ACTIVITY SYSTEM
COMPOUND SUMMARY BACKUP DETAIL

CONTRACT 22374-2104 PROJECT 02468
EXPERIMENT 505804 DETECTOR 0000D4 SPECIES DATE - 05/15/75

COMPOUND	TEST	ORG ID	CONCENTRATION	POPU EP+4	MUT1 EP+1	MUT2 EP+1	FREQ1 EP-5	FREQ2 EP-5	CONTAM
	NAN		SALINE	0947	0015	0016	1.58	1.69	0
	NAP		EMS 1.0 %	0702	0795	0422	113.25	60.11	7
000094133	NA1		0005-2 PCT.	0291	0001	0002	0.34	0.69	1
000094133	NA2		0025-3 PCT.	0441	0004	0006	0.91	1.36	0

Litton BIONETICS

REPORT EXR33 LITTON BIONETICS MUTAGENIC ACTIVITY SYSTEM
COMPOUND SUMMARY BACKUP DETAIL

CONTRACT 22374-2104 PROJECT 02468
EXPERIMENT 506301 DETECTOR TA1535 SPECIES ICRFLO DATE - 05/15/75

COMPOUND	TEST	ORG ID	CONCENTRATION	POPU EP+6	MUT1 EP+0	FREQ1 EP-8	CONTAM
	A+C		DMN 50 UM/ML	0734	0044	5.99	0
	A+T		***NO MATCH***	0819	0102	12.45	0
	A-C		SALINE	0917	0061	6.65	0
	ACP	LI	DMN 50 UM/ML	0456	5330	1168.86	1
	ACP	LU	DMN 50 UM/ML	0608	0049	8.06	0
	ACP	TE	DMN 50 UM/ML	0590	0055	9.32	0
000094133	ACT	LI1	0075-3 PCT.	0317	0067	21.14	0
000094133	ACT	LI2	0375-4 PCT.	0502	0064	12.75	0
000094133	ACT	LU1	0075-3 PCT.	0269	0066	24.54	0
000094133	ACT	LU2	0375-4 PCT.	0455	0046	10.11	0
000094133	ACT	TE1	0075-3 PCT.	0293	0048	16.38	0
000094133	ACT	TE2	0375-4 PCT.	0540	0077	14.26	0

Litton BIONETICS

REPORT EXR33 LITTON BIONETICS MUTAGENIC ACTIVITY SYSTEM
COMPOUND SUMMARY BACKUP DETAIL

CONTRACT 22374-2104 PROJECT 02468
EXPERIMENT 505901 DETECTOR TA1537 SPECIES ICRFLO DATE - 05/15/75

COMPOUND	TEST	ORG ID	CONCENTRATION	POPU EP+6	MUT1 EP+0	FREQ1 EP-8	CONTAM
	A+C		AAF 800 UG/ML	1476	0031	2.10	0
	A+T		***NO MATCH***	1524	0032	2.10	0
	A-C		DMSO	1445	0042	2.91	0
	ACP	LI	AAF 800 UG/ML	1489	0150	10.07	0
	ACP	LU	AAF 800 UG/ML	1463	0032	2.19	0
	ACP	TE	AAF 800 UG/ML	1293	0037	2.86	0
000094133	ACT	LI1	0075-3 PCT.	1102	0028	2.54	0
000094133	ACT	LI2	0375-4 PCT.	1023	0033	3.23	0
000094133	ACT	LU1	0075-3 PCT.	1295	0024	1.85	0
000094133	ACT	LU2	0375-4 PCT.	1081	0033	3.05	0
000094133	ACT	TE1	0075-3 PCT.	0450	0007	1.56	0
000094133	ACT	TE2	0375-4 PCT.	1388	0032	2.31	0

Litton BIONETICS

REPORT EXR33 LITTON BIONETICS MUTAGENIC ACTIVITY SYSTEM
COMPOUND SUMMARY BACKUP DETAIL

CONTRACT 22374-2104 PROJECT 02468
EXPERIMENT 506401 DETECTOR TA1538 SPECIES ICRFLO DATE - 05/15/75

COMPOUND	TEST	ORG ID	CONCENTRATION	POPU EP+6	MUT1 EP+0	FREQ1 EP-8	CONTAM
	A+C		AAF 800 UG/ML	0598	0067	11.20	0
	A+T		***NO MATCH***	0841	0088	10.46	0
	A-C		DMSO	0446	0047	10.54	0
	ACP	LI	AAF 800 UG/ML	0505	0189	37.43	0
	ACP	LU	AAF 800 UG/ML	0565	0071	12.57	2
	ACP	TE	AAF 800 UG/ML	0606	0076	12.54	0
000094133	ACT	LI1	0075-3 PCT.	0156	0067	42.95	0
000094133	ACT	LI2	0375-4 PCT.	0268	0078	29.10	0
000094133	ACT	LU1	0075-3 PCT.	0281	0039	13.88	0
000094133	ACT	LU2	0375-4 PCT.	0430	0050	11.63	2
000094133	ACT	TE1	0075-3 PCT.	0140	0043	30.71	2
000094133	ACT	TE2	0375-4 PCT.	0418	0044	10.53	0

REPORT EXR33 LITTON BIONETICS MUTAGENIC ACTIVITY SYSTEM
COMPOUND SUMMARY BACKUP DETAIL

CONTRACT 22374-2104 PROJECT 02468
EXPERIMENT 509302 DETECTOR TA1538 SPECIES ICRFLO DATE - 05/15/75

COMPOUND	TEST	ORG ID	CONCENTRATION	POPU EP+6	MUT1 EP+0	FREQ1 EP-8	CONTAM
	A-C		DMSO	0595	0019	3.19	0
000094133	ACT	LI1	0075-3 PCT.	0522	0030	5.75	0
000094133	ACT	LI2	0375-4 PCT.	0574	0028	4.88	0

Litton BIONETICS

REPORT EXR33 LITTON BIONETICS MUTAGENIC ACTIVITY SYSTEM
COMPOUND SUMMARY BACKUP DETAIL

CONTRACT 22374-2104 PROJECT 02468
EXPERIMENT 511205 DETECTOR TA1538 SPECIES ICRFLO DATE - 05/15/75

COMPOUND	TEST	ORG ID	CONCENTRATION	POPU EP+6	MUT1 EP+0	FREQ1 EP-8	CONTAM
	A-C		DMSO	0794	0058	7.30	0
000094133	ACT	TE1	0075-3 PCT.	0824	0065	7.89	2

REPORT EXR33 LITTON BIONETICS MUTAGENIC ACTIVITY SYSTEM
COMPOUND SUMMARY BACKUP DETAIL

CONTRACT 22374-2104 PROJECT 02468
EXPERIMENT 510401 DETECTOR 0000D4 SPECIES ICRFLO DATE - 05/15/75

COMPOUND	TEST	ORG ID	CONCENTRATION	POPU EP+4	MUT1 EP+1	MUT2 EP+1	FREQ1 EP-5	FREQ2 EP-5	CONTAM
	A+C		DMN 90 UM/ML	0706	0113	0029	16.01	4.11	0
	A+T		***NO MATCH***	1319	0201	0043	15.24	3.26	6
	A-C		SALINE	0660	0131	0022	19.85	3.33	2
	ACP	LI	DMN 90 UM/ML	0325	0067	0016	20.62	4.92	6
	ACP	LU	DMN 90 UM/ML	0870	0340	0028	39.08	3.22	2
	ACP	TE	DMN 90 UM/ML	0850	0200	0028	23.53	3.29	4
000094133	ACT	LI1	0005-2 PCT.	0478	0070	0016	14.64	3.35	2
000094133	ACT	LI2	0025-3 PCT.	0402	0045	0013	11.19	3.23	2
000094133	ACT	LU1	0005-2 PCT.	0528	0068	0017	12.88	3.22	0
000094133	ACT	LU2	0025-3 PCT.	0434	0066	0016	15.21	3.69	0
000094133	ACT	TE1	0005-2 PCT.	0509	0079	0027	15.52	5.30	4
000094133	ACT	TE2	0025-3 PCT.	0439	0124	0020	28.25	4.56	7

Litton BIONETICS

REPORT EXR33 LITTON BIONETICS MUTAGENIC ACTIVITY SYSTEM
COMPOUND SUMMARY BACKUP DETAIL

CONTRACT 22374-2104 PROJECT 02468
EXPERIMENT 506501 DETECTOR TA1535 SPECIES SPRDAW DATE - 05/15/75

COMPOUND	TEST	ORG ID	CONCENTRATION	POPU EP+6	MUT1 EP+0	FREQ1 EP-8	CONTAM
	A+C		DMN 50 UM/ML	0435	0076	17.47	0
	A+T		***NO MATCH***	0571	0063	11.03	0
	A-C		SALINE	0697	0081	11.62	0
	ACP	LI	DMN 50 UM/ML	0388	5820	1500.00	0
	ACP	LU	DMN 50 UM/ML	0410	0075	18.29	0
	ACP	TE	DMN 50 UM/ML	0356	0080	22.47	2
000094133	ACT	LI1	0075-3 PCT.	0461	0072	15.62	2
000094133	ACT	LI2	0375-4 PCT.	0592	0067	11.32	2
000094133	ACT	LU1	0075-3 PCT.	0217	0039	17.97	0
000094133	ACT	LU2	0375-4 PCT.	0314	0043	13.69	2
000094133	ACT	TE1	0075-3 PCT.	0225	0042	18.67	2
000094133	ACT	TE2	0375-4 PCT.	0590	0047	7.97	2

Litton BIONETICS

REPORT EXR33 LITTON BIONETICS MUTAGENIC ACTIVITY SYSTEM
COMPOUND SUMMARY BACKUP DETAIL

CONTRACT 22374-2104 PROJECT 02468
EXPERIMENT 507001 DETECTOR TA1537 SPECIES SPRDAW DATE - 05/15/75

COMPOUND	TEST	ORG ID	CONCENTRATION	POPU EP+6	MUT1 EP+0	FREQ1 EP-8	CONTAM
	A+C		AAF 800 UG/ML	1906	0012	0.63	0
	A+T		***NO MATCH***	2198	0027	1.23	0
	A-C		DMSO	1900	0011	0.58	0
	ACP	LI	AAF 800 UG/ML	1594	0116	7.28	0
	ACP	LU	AAF 800 UG/ML	1657	0014	0.84	2
	ACP	TE	AAF 800 UG/ML	1841	0006	0.33	2
000094133	ACT	LI1	0075-3 PCT.	1614	0009	0.56	0
000094133	ACT	LI2	0375-4 PCT.	1732	0009	0.52	0
000094133	ACT	LU1	0075-3 PCT.	1913	0017	0.89	0
000094133	ACT	LU2	0375-4 PCT.	1485	0009	0.61	0
000094133	ACT	TE1	0075-3 PCT.	1639	0011	0.67	0
000094133	ACT	TE2	0375-4 PCT.	1736	0013	0.75	0

REPORT EXR33 LITTON BIONETICS MUTAGENIC ACTIVITY SYSTEM
COMPOUND SUMMARY BACKUP DETAIL

CONTRACT 22374-2104 PROJECT 02468
EXPERIMENT 507901 DETECTOR TA1538 SPECIES SPRDAW DATE - 05/15/75

COMPOUND	TEST	ORG ID	CONCENTRATION	POPU MUT1 EP+6	EP+0	FREQ1 EP-8	CONTAM
	A+C		AAF 800 UG/ML	0445	0024	5.39	0
	A+T		***NO MATCH***	0275	0029	10.55	2
	A-C		DMSO	0392	0021	5.36	0
	ACP	LI	AAF 800 UG/ML	0507	0301	59.37	0
	ACP	LU	AAF 800 UG/ML	0588	0043	7.31	0
	ACP	TE	AAF 800 UG/ML	0541	0044	8.13	0
000094133	ACT	LI1	0075-3 PCT.	0326	0049	15.03	2
000094133	ACT	LI2	0375-4 PCT.	0275	0032	11.64	0
000094133	ACT	LU1	0075-3 PCT.	0307	0036	11.73	0
000094133	ACT	LU2	0375-4 PCT.	0358	0036	10.06	0
000094133	ACT	TE1	0075-3 PCT.	0241	0042	17.43	2
000094133	ACT	TE2	0375-4 PCT.	0439	0046	10.48	0

REPORT EXR33 LITTON BIONETICS MUTAGENIC ACTIVITY SYSTEM
COMPOUND SUMMARY BACKUP DETAIL

CONTRACT 22374-2104 PROJECT 02468
EXPERIMENT 506601 DETECTOR 000004 SPECIES SPRDAW DATE - 05/15/75

COMPOUND	TEST	ORG ID	CONCENTRATION	POPU EP+4	MUT1 EP+1	MUT2 EP+1	FREQ1 EP-5	FREQ2 EP-5	CONTAM
	A+C		DMN 90 UM/ML	1037	0006	0004	0.58	0.39	4
	A+T		***NO MATCH***	1020	0024	0028	2.35	2.75	4
	A-C		SALINE	1104	0008	0002	0.72	0.18	4
	ACP	LI	DMN 90 UM/ML	0949	0083	0097	8.75	10.22	4
	ACP	LU	DMN 90 UM/ML	0794	0027	0011	3.40	1.39	6
	ACP	TE	DMN 90 UM/ML	1035	0035	0020	3.38	1.93	4
000094133	ACT	LI1	0005-2 PCT.	0750	0022	0047	2.93	6.27	7
000094133	ACT	LI2	0025-3 PCT.	0896	0029	0061	3.24	6.81	4
000094133	ACT	LU1	0005-2 PCT.	0870	0010	0020	1.15	2.30	4
000094133	ACT	LU2	0025-3 PCT.	0878	0012	0024	1.37	2.73	4
000094133	ACT	TE1	0005-2 PCT.	1195	0026	0042	2.18	3.51	4
000094133	ACT	TE2	0025-3 PCT.	0773	0014	0020	1.81	2.59	4

Litton BIONETICS

REPORT EXR33 LITTON BIONETICS MUTAGENIC ACTIVITY SYSTEM
COMPOUND SUMMARY BACKUP DETAIL

CONTRACT 22374-2104 PROJECT 02468
EXPERIMENT 507201 DETECTOR TA1535 SPECIES RHESUS DATE - 05/15/75

COMPOUND	TEST	ORG ID	CONCENTRATION	POPU EP+6	MUT1 EP+0	FREQ1 EP-8	CONTAM
	A+C		DMN 50 UM/ML	0888	0066	7.43	2
	A+T		***NO MATCH***	0541	0076	14.05	0
	A-C		SALINE	0913	0064	7.01	0
	ACP	LI	DMN 50 UM/ML	0502	6791	1352.79	0
	ACP	LU	DMN 50 UM/ML	0823	0038	4.62	0
	ACP	TE	DMN 50 UM/ML	0625	0051	8.16	0
000094133	ACT	LI1	0075-3 PCT.	0234	0036	15.38	0
000094133	ACT	LI2	0375-4 PCT.	0337	0022	6.53	0
000094133	ACT	LU1	0075-3 PCT.	0152	0017	11.18	2
000094133	ACT	LU2	0375-4 PCT.	0346	0016	4.62	0
000094133	ACT	TE1	0075-3 PCT.	0152	0019	12.50	0
000094133	ACT	TE2	0375-4 PCT.	0280	0026	9.29	0

Litton BIONETICS

REPORT EXR33 LITTON BIONETICS MUTAGENIC ACTIVITY SYSTEM
COMPOUND SUMMARY BACKUP DETAIL

CONTRACT 22374-2104 PROJECT 02468
EXPERIMENT 511401 DETECTOR TA1537 SPECIES RHESUS DATE - 05/15/75

COMPOUND	TEST	ORG ID	CONCENTRATION	POPU EP+6	MUT1 EP+0	FREQ1 EP-8	CONTAM
	A+C		AAF 800 UG/ML	0847	0063	7.44	2
	A+T		***NO MATCH***	0515	0061	11.84	0
	A-C		DMSO	0710	0050	7.04	0
	ACP	LI	AAF 800 UG/ML	0844	0163	19.31	0
	ACP	LU	AAF 800 UG/ML	0914	0058	6.35	0
	ACP	TE	AAF 800 UG/ML	0842	0074	8.79	0
000094133	ACT	LI1	0075-3 PCT.	0501	0021	4.19	0
000094133	ACT	LI2	0375-4 PCT.	0678	0053	7.82	0
000094133	ACT	LU1	0075-3 PCT.	0363	0033	9.09	0
000094133	ACT	LU2	0375-4 PCT.	0804	0044	5.47	0
000094133	ACT	TE1	0075-3 PCT.	0564	0030	5.32	0
000094133	ACT	TE2	0375-4 PCT.	0722	0037	5.12	0

Litton BIONETICS

REPORT EXR33 LITTON BIONETICS MUTAGENIC ACTIVITY SYSTEM
COMPOUND SUMMARY BACKUP DETAIL

CONTRACT 22374-2104 PROJECT 02468
EXPERIMENT 507601 DETECTOR TA1538 SPECIES RHESUS DATE - 05/15/75

COMPOUND	TEST	ORG ID	CONCENTRATION	POPU EP+6	MUT1 EP+0	FREQ1 EP-8	CONTAM
	A+C		AAF 800 UG/ML	0802	0036	4.49	0
	A+T		***NO MATCH***	0464	0019	4.09	0
	A-C		DMSO	0721	0040	5.55	0
	ACP	LI	AAF 800 UG/ML	0601	0145	24.13	2
	ACP	LU	AAF 800 UG/ML	0649	0018	2.77	0
	ACP	TE	AAF 800 UG/ML	0572	0036	6.29	0
000094133	ACT	LI1	0075-3 PCT.	0350	0006	1.71	0
000094133	ACT	LI2	0375-4 PCT.	0454	0015	3.30	0
000094133	ACT	LU1	0075-3 PCT.	0401	0010	2.49	0
000094133	ACT	LU2	0375-4 PCT.	0445	0010	2.25	2
000094133	ACT	TE1	0075-3 PCT.	0427	0012	2.81	0
000094133	ACT	TE2	0375-4 PCT.	0516	0012	2.33	0

REPORT EXR33 LITTON BIONETICS MUTAGENIC ACTIVITY SYSTEM
COMPOUND SUMMARY BACKUP DETAIL

CONTRACT 22374-2104 PROJECT 02468
EXPERIMENT 510501 DETECTOR 0000D4 SPECIES RHESUS DATE - 05/15/75

COMPOUND	TEST	ORG ID	CONCENTRATION	POPU EP+4	MUT1 EP+1	MUT2 EP+1	FREQ1 EP-5	FREQ2 EP-5	CONTAM
	A+C		DMN 90 UM/ML	0423	0044	0007	10.40	1.65	0
	A+T		***NO MATCH***	0548	0086	0014	15.69	2.55	0
	A-C		SALINE	0759	0112	0017	14.76	2.24	0
	ACP	LI	DMN 90 UM/ML	0774	0116	0021	14.99	2.71	0
	ACP	LU	DMN 90 UM/ML	0469	0059	0011	12.58	2.35	0
	ACP	TE	DMN 90 UM/ML	0538	0108	0015	20.07	2.79	0
000094133	ACT	LI1	0005-2 PCT.	0592	0081	0013	13.68	2.20	0
000094133	ACT	LI2	0025-3 PCT.	0569	0073	0019	12.83	3.34	0
000094133	ACT	LU1	0005-2 PCT.	0611	0083	0020	13.58	3.27	0
000094133	ACT	LU2	0025-3 PCT.	0637	0092	0028	14.44	4.40	0
000094133	ACT	TE1	0005-2 PCT.	0594	0054	0009	9.09	1.52	0
000094133	ACT	TE2	0025-3 PCT.	0650	0072	0018	11.08	2.77	0